

## **Annex A**

### **Basic DBS System Characteristics and Information Related to the ITU Plans**

- Part A: Description of the data required to be submitted under  
Appendices 30 and 30A of the ITU Radio Regulations**
- Part B: Proposed modification to the Canadian entry in the ITU BSS  
Plans for the orbital position of 91° West longitude position,  
as submitted to the ITU by Industry Canada, dated March 22,  
1996.**

Part A to ANNEX A

**ANNEX 2 to AP30(Orb-85)<sup>1</sup>**

**Basic Characteristics to Be Furnished in  
Notices<sup>2</sup> Relating to Space Stations in  
the Broadcasting-Satellite Service<sup>3</sup>**

1. Country and IFRB number in the case of Regions 1 and 3; country and beam identification in the case of Region 2.
2. Nominal orbital position (in degrees from Greenwich meridian) in the case of Regions 1 and 3; orbital position (xxx.xx degrees from the Greenwich meridian) in the case of Region 2.
3. Assigned frequency or channel number.
4. Date of bringing into use.
5. Identity of the space station.
6. Service area (if necessary, the service area may be defined by a number of "test points").
7. Geographical coordinates of the intersection of the antenna beam axis with the Earth.
8. Rain-climatic zone(s)<sup>4</sup>.
9. Class of station.
10. Class of emission and necessary bandwidth.
11. Power supplied to the antenna (dBW) in the case of Regions 1 and 3; and, in the case of Region 2, power supplied to the antenna (dBW) and the maximum power

---

<sup>1</sup>Extract from ITU Radio Regulations, Appendix 30, 1992 edition. Note that references to the IFRB should now be read as Radiocommunication Bureau (BR) of the ITU. To ensure the proper interpretation of the parameters of this Annex, applicants are encouraged to review the entire Appendix of the ITU Radio Regulations.

<sup>2</sup> The Board shall develop and keep up-to-date forms of notice to meet fully the statutory provisions of this Annex.

<sup>3</sup>In Region 2, only those notices relating to frequency assignments for space stations used for telemetry and tracking purposes associated with the Region 2 Plan shall be furnished in accordance with Appendix 3 to the Radio Regulations.

<sup>4</sup>As defined in Annex 5 to Appendix (AP30(Orb-85)).

density per Hz (dB(W/Hz)) averaged over the worst 5 MHz, 40 kHz and 4 kHz, supplied to the antenna.

12. Antenna characteristics:

- a) gain of the antenna in the direction of maximum radiation referred to an isotropic radiator (dBi);
- b) shape of the beam (elliptical, circular, or other);
- c) pointing accuracy;
- d) type of polarization;
- e) sense of polarization;
- f) for circular beams indicate the following:
  - half-power beamwidth in degrees;
  - co-polar and cross-polar radiation patterns;
- g) for elliptical beams indicate the following:
  - co-polar and cross-polar radiation patterns;
  - rotation accuracy;
  - orientation;
  - major axis (degrees) at the half-power beamwidth;
  - minor axis (degrees) at the half-power beamwidth;
- h) for beams of other than circular or elliptical shape, indicate the following:
  - co-polar and cross-polar gain contours plotted on a map of the Earth's surface, preferably in a radial projection from the satellite on to a plane perpendicular to the line from the centre of the Earth to the satellite. The isotropic or absolute gain shall be indicated at each contour which corresponds to a decrease in gain of 2, 4, 6, 10 and 20 dB and thereafter at 10 dB intervals down to a value of 0 dB relative to an isotropic radiator;
  - wherever practicable, a numerical equation or table providing the necessary information to allow the gain contours to be plotted.

*In the case of Regions 1 and 3:*

- i)  $\Delta G$  (difference between the maximum gain and the gain in the direction of the point in the service area at which the power flux-density is at a minimum).

13. Station keeping accuracy.

14. Modulation characteristics:

- a) type of modulation;
- b) pre-emphasis characteristics;
- c) TV standard;
- d) sound broadcasting characteristics;
- e) frequency deviation;
- f) composition of the baseband;
- g) type of multiplexing of the video and sound signals;
- h) energy dispersal characteristics.

15. Minimum angle of elevation in the service area in the case of Region 1 and 3.

16. Type of reception (individual or community) in the case of Regions 1 and 3.
  17. Regular hours of operation (UTC).
  18. Coordination.
  19. Agreements.
  20. Other information.
  21. Operating administration or company.
- 

#### **ANNEX 2 to AP30A(Orb-88)<sup>5</sup>**

##### **Basic Characteristics to be Furnished in Notices<sup>6</sup> Relating to Feeder-Link Stations in the Fixed-Satellite Service Operating in the Frequency Bands 14.5 - 14.8 GHz and 17.3 - 18.1 GHz<sup>7</sup>**

1. The following information shall be provided in notices relating to both transmitting earth stations and receiving space stations.

- 1.1 Country and beam identification.
- 1.2 Assigned frequency
- 1.3 Assigned frequency band.
- 1.4 Date of bringing into use
- 1.5 Designation of emission (in accordance with Article 4 of the Radio Regulations).

---

<sup>5</sup> Extract from ITU Radio Regulations, Appendix 30A, 1992 edition. Note that references to the IFRB should now be read as Radiocommunication Bureau (BR) of the ITU. To ensure the proper interpretation of the parameters of this Annex, applicants are encouraged to review the entire Appendix of the ITU Radio Regulations.

<sup>6</sup> The Board shall develop and keep up-to date forms of notice to meet fully the statutory provisions of this Annex. The Board is further invited to consider the feasibility of a single notice for feeder-link earth stations operating within more than one feeder-link service area.

<sup>7</sup> Only those notices relating to frequency assignments for space stations and earth stations used for telecommand and tracking purposes associated with the Plan shall be furnished in accordance with Appendix 3 of the ITU Radio Regulations. (See CPC-2-6-04, CPC-2-6-05 and RSP-114).

**1.6 Modulation characteristics:**

- a) type of modulation;
- b) pre-emphasis characteristics;
- c) TV system;
- d) sound-broadcasting characteristics;
- e) frequency deviation;
- f) composition of the baseband;
- g) type of multiplexing of the video and sound signals;
- h) energy dispersal characteristics.

**2. The following additional information shall be provided in notices relating to transmitting earth stations.**

**2.1 Identity of the transmitting feeder-link station.**

**2.2 In the case of Region 2, geographical coordinates of the feeder-link earth station in the frequency band 17.7 - 17.8 GHz.**

**2.3 In all other cases, feeder-link service area for a feeder-link earth station identified by a set of a maximum of ten feeder-link test points.**

**2.4 Identity of the associated space station with which communication is to be established.**

**2.5 Rain-climatic zone for each test point (for guidance see Figures 1, 2 and 3 of Annex 3 to this Appendix).**

**2.6 Power characteristics of the transmission:**

**a) The following information is required for each assigned frequency:**

- total transmitting power (dBW) in the assigned frequency band supplied to the input of the antenna;
- for the band 17.3 - 18.1 GHz, the maximum power density per Hz (dB(W/Hz)) supplied to the input of the antenna averaged over the worst 1 MHz band;
- for the band 14.5 - 14.8 GHz, the maximum power density per Hz (dB(W/Hz)) supplied to the input of the antenna averaged over the worst 4 kHz band;
- for the band 17.3 - 17.8 GHz, the maximum power density per Hz (dB(W/Hz)) supplied to the input of the antenna averaged over the total RF bandwidth (24 MHz for Region 2 or 27 MHz for Regions 1 and 3).

**b) Additional information required if power control is used (see Sections 3.11 and 4.10 of Annex 3 to this Appendix):**

- range, expressed in dB, above the transmitting power used in a) above.

**2.7 Transmitting antenna characteristics of the earth station:**

- a) antenna diameter (metres);
- b) gain of the antenna in the direction of maximum radiation referred to an isotropic radiator (dBi);
- c) half-power beamwidth in degrees (describe in detail if not symmetrical);
- d) measured radiation diagram of the antenna (taking as a reference the direction of maximum radiation), or reference radiation diagram to be used for coordination;
- e) type of polarization;
- f) sense of polarization;
- g) horizon elevation angle in degrees and the antenna gain in the direction of the horizon for each azimuth<sup>1</sup> around the earth station;
- h) altitude of the antenna above mean sea level, in metres;
- i) minimum elevation angle, in degrees

**2.8 Regular hours of operation (UTC).**

**2.9 Coordination**

**2.10 Agreements**

**2.11 Other information**

**2.12 Operating administration or company**

**3. The following information shall be provided in notices relating to receiving space stations.**

**3.1 Orbital position (from the Greenwich Meridian).**

**3.2 Identify of the space station.**

**3.3 Class of station.**

**3.4 Space station receiving antenna characteristics:**

- a) gain of the antenna in the direction of maximum radiation referred to an isotropic radiator (dBi);
- b) shape of the beam (circular, elliptical or other);
- c) pointing accuracy (degrees);
- d) type of polarization;
- e) sense of polarization;
- f) for circular beams, indicate the following:
  - half-power beamwidth in degrees;
  - co-polar and cross-polar radiation patterns;
  - nominal intersection of the antenna beam axis with the Earth (boresight

---

<sup>1</sup> At suitable increments, e.g. every five degrees, in tabular or graphic form.

- longitude and latitude);
- g) for elliptical beams, indicate the following:
  - co-polar and cross-polar radiation patterns;
  - rotation accuracy (degrees);
  - orientation (degrees);
  - major axis (degrees) at the half-power beamwidth;
  - minor axis (degrees) at the half-power beamwidth;
  - nominal intersection of the antenna beam axis with the Earth (boresight longitude and latitude);
- h) for beams of other than circular or elliptical shape, indicate the following:
  - co-polar and cross-polar gain contours plotted on a map of the Earth's surface, preferably in a radial projection from the satellite onto a plane perpendicular to the axis from the centre of the Earth to the satellite. The isotropic gain shall be indicated at each contour which corresponds to a decrease in gain of 2, 4, 6, 10 and 20 dB and thereafter at 10 dB intervals down to a value of 0 dB relative to an isotropic radiator;
  - whenever practicable, a numerical equation or table providing the necessary information to allow the gain contours to be plotted;
- i) for an assignment in the bands 14.5 - 14.8 GHz or 17.7 - 18.1 GHz, the isotropic gain in the direction of those parts of the geostationary-satellite orbit which are not obstructed by the Earth. Use a diagram showing estimated isotropic gain relative to orbit longitude.

- 3.5 Receiver system noise temperature referred to the output of the antenna (Kelvins).
- 3.6 Station-keeping accuracy (degrees).
- 3.7 Regular hours of operation (UTC).
- 3.8 Coordination
- 3.9 Agreements
- 3.10 Other information
- 3.11 Operating administration or company
- 3.12 Range of automatic gain control<sup>1</sup>

---

<sup>1</sup>See Sections 3.10 and 4.9 of Annex 3 to Appendix AP30A (Orb-88).

Part B to ANNEX A

**Proposed modification to the Canadian entry in the ITU BSS Plans for the orbital position of 91° West longitude position, as submitted to the ITU by Industry Canada on March 22<sup>nd</sup>, 1996.**

The following detailed modification was submitted to the ITU Radiocommunication Bureau (BR) on March 22, 1996, in response to the possibility of this DBS system providing service throughout Canada and the continental USA. It should be noted that the modification submitted to the ITU has not been coordinated with potentially-affected entries in the BSS and feeder-link Plans. Any variation of this proposed modification of the Plans will also require coordination (the extent will be determined by the ITU BR) with potentially-affected entries in the Plans.



AP30A(0rb-88)

ANNEX 2

**Basic Characteristics to be furnished In Notices Relating  
to Feeder-Link Stations in the Fixed-Satellite Service Operating  
in the Frequency Bands 14.5-14.8 GHz and 17.3-18.1 Ghz**

1. Information relating to both transmitting earth stations and receiving space stations.

1.1 Country: CANADA

Beam Identification CAN-BSS2  
Replaces Beams CAN01304, CAN01404, CAN01504,  
CAN03304, CAN03404, CAN03504

1.2 Assigned frequency: Channels 1 to 32 inclusively (24 MHz channels)

1.3 Assigned frequency band: 17.3 - 17.8 Ghz

1.4 Date of bringing into use: 01/01/98 CAN-BSS2A  
01/04/98 CAN-BSS2B

1.5 Designation of emission: 24M0G7W

1.6 Modulation Characteristics:

- a) Type of modulation: QPSK
- b) Transmission rate (FEC included): 39.0 Mb/s
- c) Type of multiplexing: Time division multiplexing (TDM)
- d) Multiplexed digital video
- e) Multiplexed digital audio
- f) Multiplexed data channels

2. Information relating to transmitting earth stations.

2.1 Identity: Typical Feederlinks

2.2 Coordinates of Feeder-link earth stations:

The geographical coordinates below pertain to typical feederlink earth stations which will be operating in the 17.7 -17.8 GHz band. The exact location of the earth stations and the antenna elevation above mean sea level could vary after the final selection of the earth station location is made, however, the earth station parameters will be selected such that the coordination area will not extend into the territory of those administrations which are not included in the coordination area of the typical earth stations listed below.

<u>Location</u>	<u>Latitude</u>	<u>Longitude</u>	<u>Rain Zone</u>	<u>Height AMSL (m)</u>
Montreal	45.52°N,	73.55°W	K	20
Toronto	43.65°N,	79.33°W	K	75
Edmonton	53.49°N,	113.49°W	E	674
Vancouver	49.27°N,	123.08°W	D	4
New York	40.70°N,	74.02°W	K	91
Savannah	32.08°N	81.09°W	M	6
Tallahassee	30.44°N	84.28°W	N	46
El Paso	31.75°N	106.50°W	M	1126
Nogales	31.33°N	110.93°W	E	1500
Denver	39.51 °N,	105.02°W	E	1687
Los Angeles	34.09°N,	118.32°W	E	99
Honolulu	21.19°N	157.50°W	D	7

### 2.3. Service area:

The following test points are used to delimit the service area for feederlink earth stations operating in the 17.3-17.7 GHz band.

<u>Test Point</u>	<u>Latitude</u>	<u>Longitude</u>	<u>Rain Zone</u>
1)	25.14°N,	81.02°W	N
2)	29.49°N,	90.52°W	N
3)	26.41 °N,	98.23°W	M
4)	34.80°N,	119.90°W	E
5)	49.63°N,	125.84°W	D
6)	62.45°N,	114.40°W	C
7)	55.70°N,	71.47°W	C
8)	46.80°N,	53.28°W	K
9)	44.34°N,	65.81W°	K
10)	36.99°N,	77.18°W	K
11)	21.19°N	157.50°W	D

2.4 Associated space station: CAN-BSS2A AND CAN-BSS2B (co-located)

2.5 Rain climatic zone for each test point: According to AP30A/Annex 3, Figure 2  
(See also item 2.3)

### 2.6 Power:

a) For all assigned channels and all beams:

2.6.1 Transmitting power: 30.0dBW

2.6.2 Maximum power density:

-42.9 dB(W/Hz) averaged over the worst 1 MHz

-43.8 dB(W/Hz) averaged over the entire RF bandwidth

b) Power control: the maximum transmit power level will not exceed 35 dBW with maximum uplink power control (per Annex 4 of AP30A)

### 2.7 Transmitting antenna characteristics:

a) Antenna diameter: 5m or larger

- b) Antenna gain: 57.2 dBi or more
  - c) Half-power beamwidth: 0.25° or less
  - d) Reference radiation diagram: In conformity with the diagram used for ORB-88 plan, AP30A, Annex 3, Figure 6
  - e) Polarization: Circular
  - f) Sense of polarization: 1 (RHC) for odd channels  
2 (LHC) for even channels
  - g) Antenna gain in the direction of the horizon: <3 dBi  
(0° horizon elevation angle all around)
  - h) Antenna altitude AMSL: varies depending on location
  - i) Minimum elevation angle: 10°
- 2.8 Regular hours of operation: 24th for 365 days
- 2.9 Coordination: Will be required with the Mexican (MEX) and United States of America (USA) administrations.
- 2.10 Agreements: None
- 2.11 Other Information: None
- 2.12 Operating Administration: Director General,  
Radiocommunication and Broadcasting Regulatory Branch  
Industry Canada  
Journal Building, North  
300 Slater Street  
Ottawa, Ontario, Canada  
K1A 0C8
3. Information relating to receiving space station:
- 3.1 Orbital position: 91°W (nominal)
- The two satellites can be located anywhere within  
+/- 0.2° of the center of the cluster per section 4.13.1 of  
Annex 3 to AP30A
- 3.2 Identity: CAN-BSS2A and CAN-BSS2B (co-located)
- 3.3 Class of station: EC, ED
- 3.4 Space station receiving antenna characteristics:
- a) Maximum gain: 32.0 dBi
  - b) Shape of the beam: Shaped Beam
  - c) Pointing accuracy: 0.1° in all direction
  - d) Type of polarization: Circular
  - e) Sense of polarization: 1(RHC) for odd channels  
2(LHC) for even channels
  - f) Circular beams: Not applicable
  - g) Elliptical beams: Not applicable
  - h) Other beams: Figure 1 contains the co-polar antenna pattern.

- i) Gain versus orbit:      The cross-pol gain will not exceed 0 dBi.  
The satellite receive gain towards any point on the geostationary orbit that is not obstructed by the Earth will not exceed 0 dBi.
- 3.5 Receiver system noise temperature:      900 K
- 3.6 Station keeping accuracy:       $\pm 0.1^\circ$
- 3.7 Regular hours of operation:      24h for 365 days
- 3.8 Coordination:      Will be required with the USA administration
- 3.9 Agreements:      None
- 3.10 Other Information:      None
- 3.11 Operating administration:      Industry Canada (see 2.12 for more information)
- 3.12 Dynamic range of automatic gain control:      15 dB

**AP30(WARC-77)  
ANNEX 2**

**Basic Characteristics to be Furnished in  
Notices Relating to Space Stations in  
the Broadcasting-Satellite Service**

1. Country: CANADA  
  
Beam Identification: CAN-BSS2  
Replaces Beams: CAN01304, CAN01404, CAN01504,  
CAN03304, CAN03404, CAN03504
2. Nominal orbital position: 91°W  
  
The two satellites can be located anywhere within  
+/- 0.2° of the center of the cluster per section B of  
Annex 7 to AP30
3. Channel Number: 1 to 32 inclusively (24 MHz channels)
4. Date of bringing into use: 01/01/98 CAN-BSS2A  
01/04/98 CAN-BSS2B
5. Identity of the space station: CAN-BSS2A and CAN-BSS2B (co-located)
6. Service area:  
The following test points are used to delimit the service area for receive earth stations operating with this  
satellite  

Test Point	Latitude	Longitude	Rain Zone
1)	25.14°N	81.02°W	N
2)	29.49°N	90.52°W	N
3)	26.41°N	98.23°W	M
4)	34.80°N	119.90°W	E
5)	49.63°N	125.84°W	D
6)	62.45°N	114.40°W	C
7)	55.70°N	71.47°W	C
8)	46.80°N	53.28°W	K
9)	44.34°N	65.8°W	K
10)	36.99°N	77.18°W	K
11)	21.19°N	157.50°W	D
7. Intersection of the beam axis with the Earth: Not applicable for shaped beams
8. Rain climatic zone(s): According to AP30, Annex 5, Figure 3 (see item 6)
9. Class of station: EV, ER
10. Class of emission and necessary bandwidth: 24MOG7W

11. Power supplied to the antenna: Maximum power density:	22.6 dBW  -50.3 dB (W/Hz) averaged over the worst 5 MHz -50.3 dB (W/Hz) averaged over the worst 40 KHz -50.3 dB (W/Hz) averaged over the worst 4 KHz
12. Antenna characteristics:	
a) Maximum gain:	32.0 dBi
b) Shape of the beam:	Shaped Beam
c) Pointing accuracy:	0.1° in all direction
d) Type of polarization:	Circular
e) Sense of polarization:	1 (RHC) for odd channels 2 (LHC) for even channels
f) Circular beams:	Not applicable
g) Elliptical beams:	Not applicable
h) Other beams:	Figure 1 contains the co-polar antenna pattern and The cross-pol gain will not exceed 0 dBi.
i) Not applicable for Region 2	
13. Station keeping accuracy:	±0.1°
14. Modulation Characteristics:	
<u>Emission 24 MOG7W</u>	
a) Type of modulation:	QPSK
b) Transmission rate (FEC included):	39.0 Mb/s
c) Type of multiplexing:	Time division multiplexing (TDM)
d) Multiplexed digital video	
e) Multiplexed digital audio	
f) Multiplexed data channels	
15. Minimum angle of elevation:	Not applicable to Region 2
16. Type of reception:	Not applicable to Region 2
17. Regular hours of operation:	24th for 365 days
18. Coordination:	Will be required with the USA administration
19. Agreements: None	
20. Other information:	None
21. Operating Administration:	Director General, Radiocommunication and Broadcasting Regulatory Branch Industry Canada Journal Building, North 300 Slater Street Ottawa, Ontario, Canada K1A 0C8

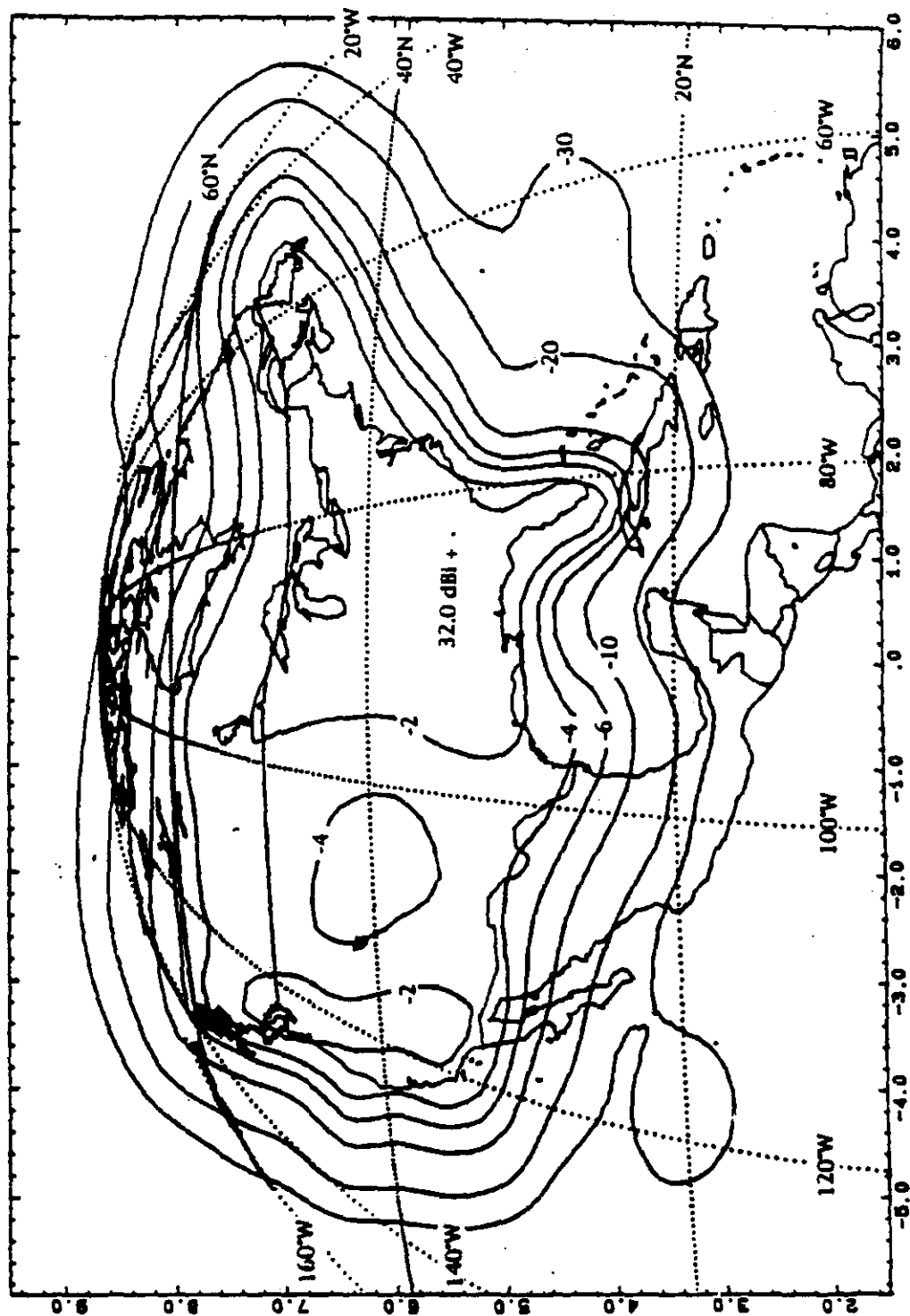


Figure 1 - Co-Polar Antenna Gain Contours (Satellite at 91°W)

# Satellite Operating Characteristics for Nimiq DBS Satellite at 91° W.L.

The frequency and polarization plan of Table 1 below assigns thirty-two (32) RF channels, with a nominal bandwidth of 24 MHz, in the 17/12 GHz bands. The communications subsystem shall provide for reception and transmission of circularly orthogonal polarized RF signals, as shown in Table 1. The channels sharing a TWT pair as their primary amplifier in high power is also shown in the table. There shall be no limitations on which channels can be operated in the medium or high power mode other than the constraint of only being able to route one of two possible channels through a designated TWT pair in high power mode. In addition, in medium power mode no more than thirty-two (32) RF channels shall be used and in high power mode no more than sixteen (16) RF channels shall be used. It shall be allowable to turn on additional TWTs without RF power for conditioning purposes or in stand-by subject to power and thermal constraints. Table 1 below also shows the maximum saturation flux density, the downlink EIRP, and the satellite TWT RF power for each transponder.

Table 1 – Nimiq 91 W.L.

Transponder #	SFD (dBW/m <sup>2</sup> )	Frequency (MHz)	Downlink EIRP (dBW)	Downlink Amplifier Power (dBW)	Frequency (MHz)	Pol	Primary TWT Pairs
1	-75.4	17324	52.7	17	12224	RHCP	A
3	-75.4	17353	52.7	17	12253	RHCP	B
5	-75.4	17382	52.7	17	12282	RHCP	C
7	-75.4	17411	52.7	17	12311	RHCP	D
9	-75.4	17441	52.7	17	12341	RHCP	E
11	-75.4	17470	52.7	17	12370	RHCP	F
13	-75.4	17499	52.7	17	12399	RHCP	G
15	-75.4	17528	52.7	17	12428	RHCP	H
17	-75.4	17557	52.7	17	12457	RHCP	J
19	-75.4	17586	52.7	17	12486	RHCP	K
21	-75.4	17616	52.7	17	12516	RHCP	L
23	-75.4	17645	52.7	17	12545	RHCP	M
25	-75.4	17674	52.7	17	12574	RHCP	N
27	-75.4	17703	52.7	17	12603	RHCP	O
29	-75.4	17732	52.7	17	12632	RHCP	P
31	-75.4	17761	52.7	17	12661	RHCP	Q
2	-75.4	17339	52.7	17	12239	LHCP	A
4	-75.4	17368	52.7	17	12268	LHCP	B
6	-75.4	17397	52.7	17	12297	LHCP	C
8	-75.4	17426	52.7	17	12326	LHCP	D
10	-75.4	17455	52.7	17	12355	LHCP	E
12	-75.4	17484	52.7	17	12384	LHCP	F
14	-75.4	17514	52.7	17	12414	LHCP	G



16	-75.4	17543	52.7	17	12443	LHCP	H
18	-75.4	17572	52.7	17	12472	LHCP	J
20	-75.4	17601	52.7	17	12501	LHCP	K
22	-75.4	17630	52.7	17	12530	LHCP	L
24	-75.4	17659	52.7	17	12559	LHCP	M
26	-75.4	17689	52.7	17	12589	LHCP	N
28	-75.4	17718	52.7	17	12618	LHCP	O
30	-75.4	17747	52.7	17	12647	LHCP	P
32	-75.4	17776	52.7	17	12676	LHCP	Q

Command Channel:

17301.5 MHz

Telemetry:

12201 MHz

12202 MHz

12699 MHz

Allocated bandwidth of emission:

24 MHz

Emission designators:

24M0G7W

Receiving system noise temperature:

900 K

Satellite Receive Antenna Gain:

33.7 dBi

Satellite Receive Antenna Pattern and Contour:

See Appendix 1

Satellite Transmit Antenna Gain:

35.5 dBi

Satellite Transmit Antenna Pattern and Contour:

See Appendix 2

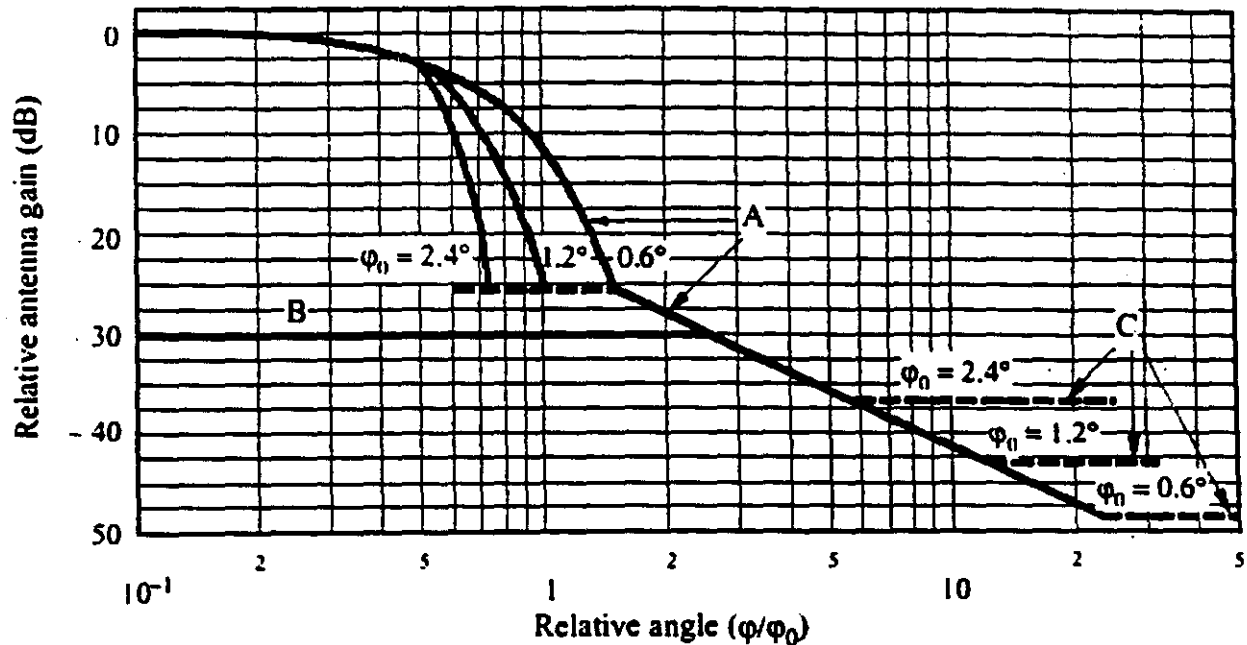
Orbital location:

91° West Longitude  
(nominal)



Appendix 1 - Satellite receive antenna gain pattern, meets ITU Radio Regulations  
Appendix S30A, Annex 3 Figure 8:

Reference patterns for co-polar and cross-polar components for satellite receiving antennas with fast roll-off in the main beam for Region 2



APS30A/30AA3-08

Curve A: co-polar component (dB relative to main beam gain)

$$\begin{array}{ll}
 -12 \left( \frac{\phi}{\phi_0} \right)^2 & \text{for } 0 \leq \phi / \phi_0 \leq 0.5 \\
 -33.33 \phi_0^2 \left( \frac{\phi}{\phi_0} - x \right)^2 & \text{for } 0.5 < \phi / \phi_0 \leq 0.87 / \phi_0 + x \\
 -25.23 & \text{for } 0.87 / \phi_0 + x < \phi / \phi_0 \leq 1.413 \\
 -(22 + 20 \log (\phi / \phi_0)) & \text{for } \phi / \phi_0 > 1.413
 \end{array}$$

after intersection with curve C, as curve C

Curve B: cross-polar component (dB relative to main beam gain)

$$-30 \quad \text{for } 0 \leq \phi / \phi_0 < 2.51$$

after intersection with curve A, as curve A

Curve C: minus the on-axis gain (curves A and C represent examples for three antennas having different values of  $\phi_0$  as labeled in Fig. 8. The on-axis gains of these antennas are 37, 43 and 49 dBi, respectively).

where:

$\varphi$ : off-axis angle (degrees)

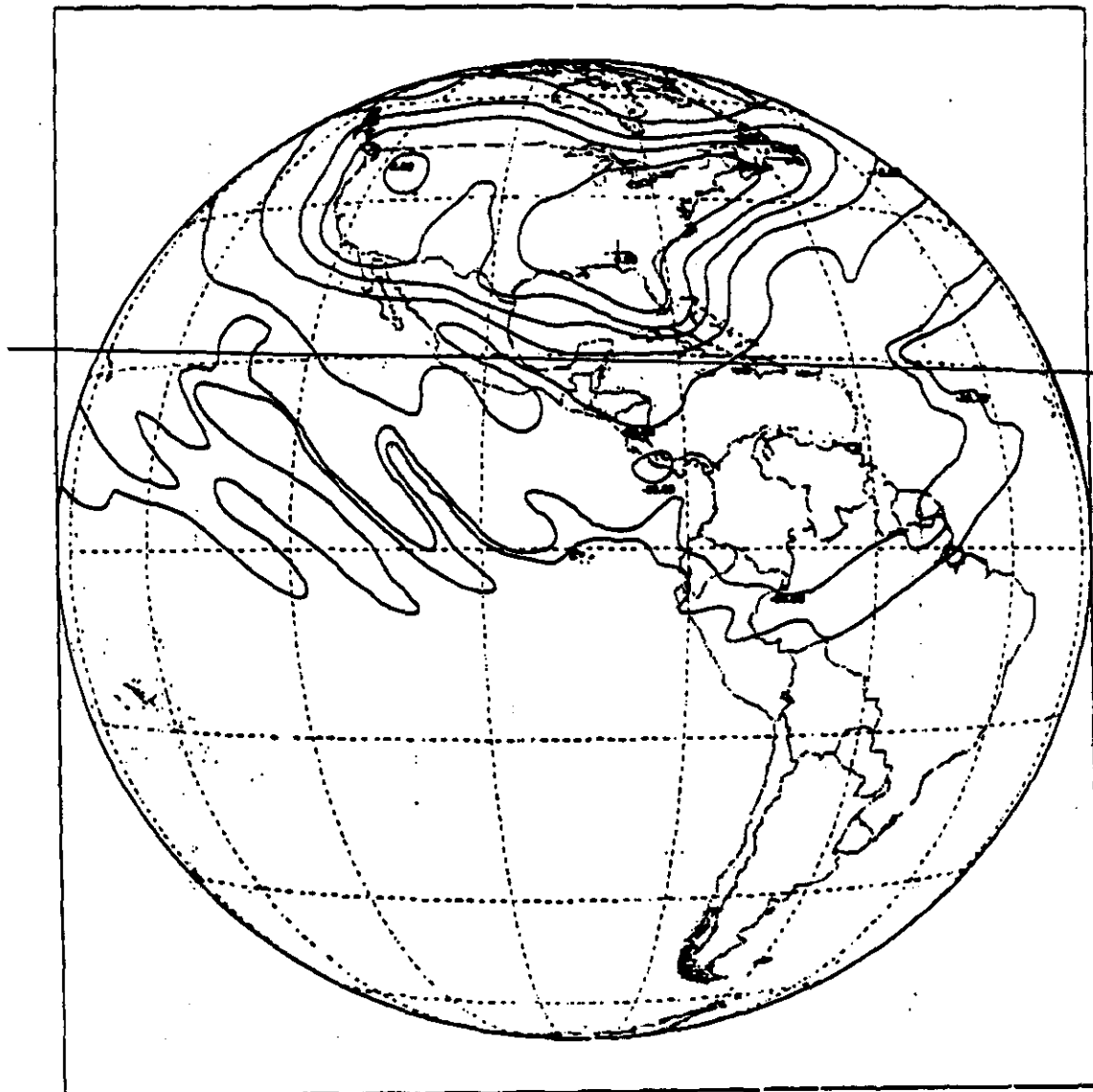
$\varphi_0$ : dimension of the minimum ellipse fitted around the feeder-link service area in the direction of interest (degrees)

$$x = 0.5(1 - 0.6/\varphi_0).$$

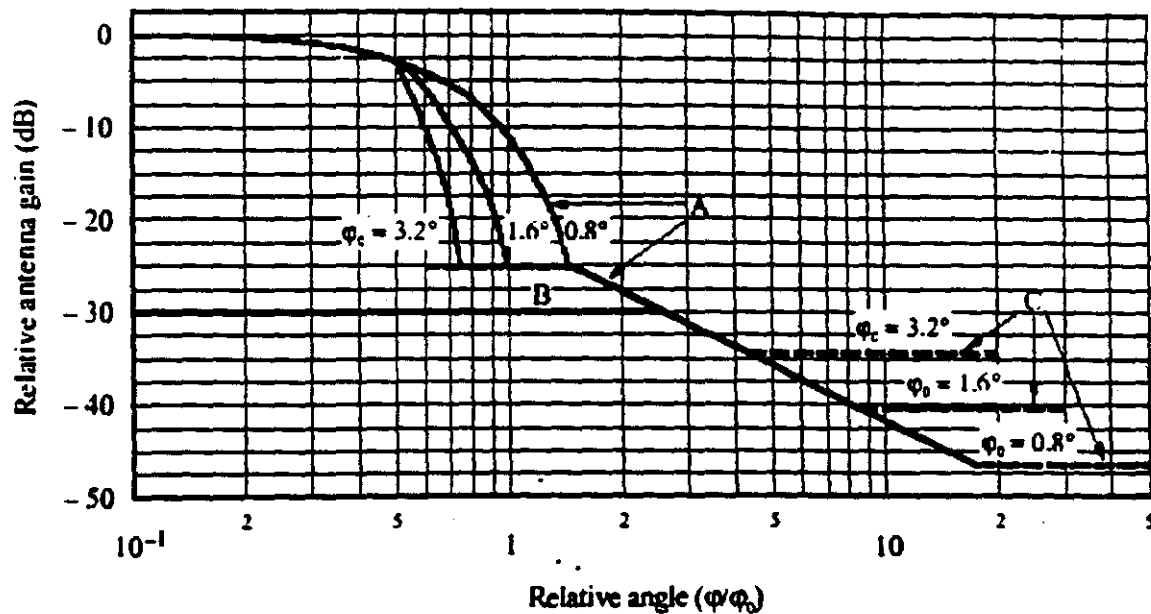
Notice ID : 00055003  
Administration : CAN  
Satellite Network : CAN-0002  
Beam : CBR  
Emission / Reception : A  
Polarization : C  
Service Area Number :  
Service Area Name :  
Reason : B  
Satellite Position : -81.000

+  
Antenna bore-sight  
-3 dB  
-4 dB  
-6 dB  
-10 dB  
-20 dB  
-30 dB  
-33.7 dB

up



**Appendix 2 - Reference patterns for co-polar and cross-polar components for satellite transmitting antennas with roll-off in the main beam for Region 2**



**APS30 533**

*Curve A: Co-polar component (dB relative to main beam gain)*

$$-12 (\varphi/\varphi_0)^2 \quad \text{for} \quad 0 \leq (\varphi/\varphi_0) \leq 0.5$$

$$-12 \{((\varphi/\varphi_0 - x)/(B \min/\varphi_0))\}^2 \quad \text{for} \quad 0.5 < (\varphi/\varphi_0) \leq \{(1.45/\varphi_0) B \min + x\}$$

$$-25.23 \quad \text{for} \quad \{(1.45/\varphi_0) B \min + x\} < (\varphi/\varphi_0) \leq 1.45$$

$$-(22 + 20 \log (\varphi/\varphi_0)) \quad \text{for} \quad (\varphi/\varphi_0) > 1.45$$

after intersection with curve C: Curve C

*Curve B: Cross-polar component (dB relative to main beam gain)*

$$-30 \quad \text{for} \quad 0 \leq (\varphi/\varphi_0) < 2.51$$

after intersection with co-polar pattern: co-polar pattern

*Curve C:* Minus the on-axis gain (Curves A and C represent values of  $\varphi_0$  as labeled in Fig. 11A. The on-axis gains of these antennas are approximately 34, 40 and 46 dBi, respectively).

where:

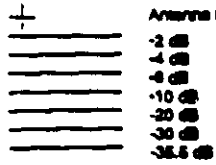
$\varphi$  : off-axis angle (degrees)

$\varphi_0$  : dimension of the minimum ellipse fitted around the downlink service area in the direction of interest (degrees)

$B_{min} = 0.8^\circ$  for Region 2 and  $B_{min} = 0.6^\circ$  for Regions 1 and 3

$x = 0.5 (1 - 0.8/\varphi_0)$  in Region 2

Notes ID : 00055003  
Administration : CAN  
Satellite Network : CAN-BSE2  
Beam : CBT  
Emission / Reception : E  
Polarization : C  
Service Area Number :  
Service Area Name :  
Reason : B  
Satellite Position : -01.000



down





READ INSTRUCTIONS CAREFULLY  
BEFORE PROCEEDING

FEDERAL COMMUNICATIONS COMMISSION  
REMITTANCE ADVICE

Approved by OMB

3060-0589

Page No 1 of 1

(1) LOCKBOX #

358160

SPECIAL USE

FCC USE ONLY

SECTION A - PAYER INFORMATION

(2) PAYER NAME (if paying by credit card, enter name exactly as it appears on your card)

McGuireWoods LLP

(3) TOTAL AMOUNT PAID (U.S. Dollars and cents)

\$145.00

(4) STREET ADDRESS LINE NO. 1

/o James U. Troup

(5) STREET ADDRESS LINE NO. 2

1050 Connecticut Avenue, NW, Suite 1200

(6) CITY

Washington

(7) STATE

DC

(8) ZIP CODE

20036

5317

(9) DAYTIME TELEPHONE NUMBER (include area code)

202-857-1700

(10) COUNTRY CODE (if not in U.S.A.)

FCC REGISTRATION NUMBER (FRN) AND TAX IDENTIFICATION NUMBER (TIN) REQUIRED

(11) PAYER (FRN)

0005-8579-17

(12) PAYER (TIN)

54-0505857

IF PAYER NAME AND THE APPLICANT NAME ARE DIFFERENT, COMPLETE SECTION B  
IF MORE THAN ONE APPLICANT, USE CONTINUATION SHEETS (FORM 159-C)

(13) APPLICANT NAME

NSNet Holdings, Inc.

(14) STREET ADDRESS LINE NO. 1

11044 Research Boulevard

(15) STREET ADDRESS LINE NO. 2

Suite C-500

(16) CITY

Austin

(17) STATE

TX

(18) ZIP CODE

78759

(19) DAYTIME TELEPHONE NUMBER (include area code)

(512) 327-3300

(20) COUNTRY CODE (if not in U.S.A.)

FCC REGISTRATION NUMBER (FRN) AND TAX IDENTIFICATION NUMBER (TIN) REQUIRED

(21) APPLICANT (FRN)

0005-0882-65

(22) APPLICANT (TIN)

742903386

COMPLETE SECTION C FOR EACH SERVICE, IF MORE BOXES ARE NEEDED, USE CONTINUATION SHEET

(23A) CALL SIGN/OTHER ID

(24A) PAYMENT TYPE CODE

CG0

(25A) QUANTITY

1

(26A) FEE DUE FOR (PTC)

(27A) TOTAL FEE

\$145.

FCC USE ONLY

(28A) FCC CODE 1

(29A) FCC CODE 2

(23B) CALL SIGN/OTHER ID

(24B) PAYMENT TYPE CODE

(25B) QUANTITY

(26B) FEE DUE FOR (PTC)

(27B) TOTAL FEE

FCC USE ONLY

(28B) FCC CODE 1

(29B) FCC CODE 2

SECTION D - CERTIFICATION

(30) CERTIFICATION STATEMENT

Adrian B. Copiz

to the best of my knowledge, information and belief.

SIGNATURE

DATE January 11, 2002

SECTION E - CREDIT CARD PAYMENT INFORMATION

(1)

MASTERCARD/VISA ACCOUNT NUMBER:

EXPIRATION

☐ MASTERCARD

☐ VISA

I hereby authorize the FCC to charge my VISA or MASTERCARD for the service(s)/authorization herein described.

SIGNATURE

DATE

READ INSTRUCTIONS CAREFULLY  
BEFORE PROCEEDING

FEDERAL COMMUNICATIONS COMMISSION  
REMITTANCE ADVICE

Approved by OMB  
3060-0589  
Page No. 1 of 1

1) LOCKBOX #

58160

SPECIAL USE

FCC USE ONLY

SECTION A - PAYER INFORMATION

(2) PAYER NAME (if paying by credit card, enter name exactly as it appears on your card)

VSNet Holdings, Inc.

(3) TOTAL AMOUNT PAID (U.S. Dollars and cents)

\$7,510.00

(4) STREET ADDRESS LINE NO. 1

1044 Research Boulevard

(5) STREET ADDRESS LINE NO. 2

Suite C-500

(6) CITY

Austin

(7) STATE

TX

(8) ZIP CODE

78759

(9) DAYTIME TELEPHONE NUMBER (include area code)

512) 327-3300

(10) COUNTRY CODE (if not in U.S.A.)

FCC REGISTRATION NUMBER (FRN) AND TAX IDENTIFICATION NUMBER (TIN) REQUIRED

(11) PAYER (FRN)

005-0882-65

(12) PAYER (TIN)

74-903386

IF PAYER NAME AND THE APPLICANT NAME ARE DIFFERENT, COMPLETE SECTION B  
IF MORE THAN ONE APPLICANT, USE CONTINUATION SHEETS (FORM 159-C)

(3) APPLICANT NAME

(4) STREET ADDRESS LINE NO. 1

(5) STREET ADDRESS LINE NO. 2

(6) CITY

(17) STATE

(18) ZIP CODE

(9) DAYTIME TELEPHONE NUMBER (include area code)

(20) COUNTRY CODE (if not in U.S.A.)

FCC REGISTRATION NUMBER (FRN) AND TAX IDENTIFICATION NUMBER (TIN) REQUIRED

(1) APPLICANT (FRN)

(22) APPLICANT (TIN)

COMPLETE SECTION C FOR EACH SERVICE, IF MORE BOXES ARE NEEDED, USE CONTINUATION SHEET

3A) CALL SIGN/OTHER ID

(24A) PAYMENT TYPE CODE

(25A) QUANTITY

BGV

1

5A) FEE DUE FOR (PTC)

(27A) TOTAL FEE

\$7510.00

FCC USE ONLY

8A) FCC CODE 1

(29A) FCC CODE 2

3B) CALL SIGN/OTHER ID

(24B) PAYMENT TYPE CODE

(25B) QUANTITY

5B) FEE DUE FOR (PTC)

(27B) TOTAL FEE

FCC USE ONLY

8B) FCC CODE 1

(29B) FCC CODE 2

SECTION D - CERTIFICATION

(1) CERTIFICATION STATEMENT

Adrian B. Copiz

, certify under penalty of perjury that the foregoing and supporting information is true and correct to

best of my knowledge, information and belief.

SIGNATURE

DATE January 11, 2002

SECTION E - CREDIT CARD PAYMENT INFORMATION

MASTERCARD/VISA ACCOUNT NUMBER:

EXPIRATION

☐ MASTERCARD

☐ VISA

I hereby authorize the FCC to charge my VISA or MASTERCARD for the service(s)/authorization herein described.

SIGNATURE

DATE

Fee Control Number	Payor Name	Fcc Account Number	Payer TIN	Received Date							
0201148160054003	WSNET HOLDINGS INC 11044 RESEARCH BOULEVARD SUITE C 500 AUSTIN TX 78759	WP00046451	0074903386	1/11/2002 00:00:0							
Payment Amount	Current Balance	Seq Num	Payment Type Code	Quantity	Callsign Other Id	Applicant Name	Applicant Zip	Bad Check	Detail Amount	Trans Code	Payment Type
\$7,510.00	\$7,510.00	1	BGV	1		WSNET HOLDINGS INC	78759		\$7,510.00	1	PMT
Total	1								\$7,510.00		